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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION OF: KENICHI HIROTA ET AL.

SERIAL NO. : 09/700,704

FILED : NOVEMBER 24, 2000

FOR : CLEANING SOLUTION AND CLEANING METHOD FOR
COMPONENT OF SEMICONDUCTOR PROCESSING APPARATUS

GROUP : 1746

EXAMINER : KORNAKOV, M.

DECLARATION PURSUANT 37 C.F.R. 1.132

1. I, Kenichi Hirota, declare and state that:

I am a citizen and resident of Japan and one of the inventors of the above-identified application. Further, I am familiar with the above-identified patent application, the Office Action dated October 02, 2002, and the references cited therein.

2. I conducted the following experiment in order to prove the effect of the present invention.

[Condition]

Different three cleaning solutions S1, S2, and S3 were prepared. The cleaning solution S1 consisted of NMP (N-methyl-2-pyrrolidone) alone. The cleaning solution S2 consisted of ethylene glycol monobutyl ether alone. The cleaning solution S3 consisted of a mixture of NMP and ethylene glycol monobutyl ether at a ratio of 75:15.

Test pieces each formed of an essentially inactive substrate with a 100g-urethane coating applied thereon were prepared. The test pieces were respectively immersed in the cleaning solutions S1, S2, and S3 to measure the solubility of the urethane coating in the cleaning solutions S1, S2, and S3. At this time, the cleaning solutions S1, S2, and S3 were set at a temperature of 60°C, and provided with no ultrasonic waves. The urethane coating was used as an alternative to CF-based byproducts deposited inside a process chamber for etching a silicon oxide film by CF₄. This was so, because they have compositions very similar to each other.

[Result]

Tables R1, R2, and R3 shows experimental results, when using the cleaning solutions S1, S2, and S3, respectively. In the tables, Time denotes the immersion period of time, and Dissolved Amount denotes the dissolved amount of the urethane coating.

As shown in the tables, the solubility in the cleaning solution S3 was more than two times that in the cleaning solution S1. Furthermore, the solubility in the cleaning solution S3 was more than five times that in the cleaning solution S2. Accordingly, it has been confirmed that the mixture solution of NMP and ethylene glycol monobutyl ether provides a solubility of the urethane coating larger than those provided by using each of the solutions alone.

Table R1

Time (min)	Dissolved Amount (g)
10	4.2
20	9.6
30	13.6
40	18.0
50	23.6
60	28.3
70	33.9
80	37.6

Table R2

Time (min)	Dissolved Amount (g)
10	2.0
20	3.5
30	6.3
40	7.8
50	9.5
60	11.6
70	13.0
80	14.6

Table R3

Time (min)	Dissolved Amount (g)
10	10.5
20	21.0
30	32.0
40	42.3
50	55.2
60	61.2
70	69.8
80	78.3

3. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: March 7 , 2003


Kenichi Hirota